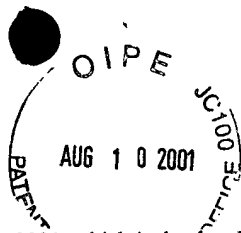


Serial No. 09/558,453



08-13-

Docket No. 15939-18

2834

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I hereby certify that on **August 10, 2001**, which is the date I am signing this certificate, I am depositing this correspondence the United States Postal Service, Express mail, in an envelope addressed to the Assistant Commissioner of Patents, Washington, D.C. 20231
Express Mail No. EL585705656US

Applicant: Liu et al.
Serial No.: 09/558,453
Filed: April 25, 2000
Title: Spindle Motor With an Aerodynamic and Hydrodynamic Bearing Assembly
Examiner: T. Lam
Group Art Unit: 2834

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#6/Ext. ② w/a
Hawkins
8/20/01

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Assistant Commissioner for Patents
Washington, D.C. 20231

RESPONSE

Sir:

In response to the Office Action of March 28, 2001 please amend the above-identified application as follows:

- ✓ In the Claims
- ✓ Please cancel claim 1.

Rewrite dependant claim 2 in independent form and amend claim 6 as follows, a marked up set of claims to show changes is appended hereto.

2. A spindle motor including a stator component, a rotor component, including a hub for supporting one or more discs, and a bearing assembly between the components, formed of a journal bearing and a thrust bearing, wherein the journal bearing is an aerodynamic bearing and the thrust bearing is adapted to function in a bi-directional manner and includes an annular member projecting radially from one of the components into an associated recess formed in the other of the components, wherein the annular member has two opposed bearing faces arranged

a'
sub
B1

SUB
B1
A1 cont.
amended
adjacent corresponding bearing surfaces of the recess, and a hydrodynamic bearing is formed between the respective bearing faces and surfaces.

A2 sub B2
6. A spindle motor as claimed in claim 5, wherein the shaft is fixed relative to the stator and the sleeve forms part of the rotor.

REMARKS

The Office Action of March 28, 2001, the references cited and the Examiner's comments thereon have been carefully considered. The Multiple dependence of claim 6 has been amended by the within amendment to be singly dependent upon the multiply dependent claim 5. It is submitted that claim 6 is now in proper form for examination on the merits along with claim 7 which was not mentioned in the Office Action.

Claim 2 has been rewritten in independent form by the within amendment and constitutes applicant's new independent claim, prior claim 1 having been cancelled by the within amendment. It is respectfully submitted that the Asada reference, when properly interpreted, does not render independent claim 2, or any of its dependent claims, obvious when considered alone or in view of the secondary reference of Tielemans.

It is clear from a reading of the Asada primary reference that in Asada the thrust bearing is member 25 (column 3, lines 62-68) which is fixed to the hub 23 by screws 28. The member 24 noted by the Examiner in the reference is not a thrust bearing and does not function as such in the Asada et al. disclosure. The member 24 in Asada is described as a "stepped flange member 24 fixed at an upper end portion of the shaft 22 and cooperates with a ring shaped member 26 which in turn has a seal ring 27."

Upon operation of Asada's device, as taught in detail in the specification (column 4, lines 19-37) "the thrust bearing 25 overcomes the attracting force of the motor 31 and is raised by a

predetermined amount from the upper end of the stepped flange member 24 for rotation without contact". As seen in Fig. 4, each end face of the flange portion 24B of the stepped flange member 24 is located within the space 23B of the hub 23 so as to serve as a retainer for the rotary member. According to the reference the device supports the load in one direction (uni-direction) only. A careful reading of the Asada reference does not find any teaching or suggestion that the "stepped flange member 24" may work as a thrust bearing other than merely as a retainer. Certainly member 24 in Asada could not be considered a bi-directional thrust bearing as recited in applicants independent claim 2.

Should the device in Asada be operated in a bi-directional operation, it appears that the only choice provided would be to utilize the magnetic force to hold (attract) the rotating part toward the stationary part. While this force would not be controllable, it might be designed at least strong enough to overcome the weight of the rotating part (in the case of hard disk drives, this is non trivial as there are a plurality of recording disk platters mounted on the hub). There would thus be excessive power loss for high speed operation due to much higher bearing pressure than is required not only to maintain the bearing operation but also to overcome the magnetic attraction force. In such an arrangement if the thrust force is higher than necessary, a seizure of the motor could occur. In accordance with the present invention as defined in independent claim 2, applicants two opposed bearing faces arranged adjacent corresponding bearing surfaces in the recess forming a hydrodynamic bearing overcomes all of such problems. Applicant's spindle motor construction and mode of operation also addresses the industry needs for high speed operation as the demand for high recording speed and high data transfer rate increases as has occurred in recent years.

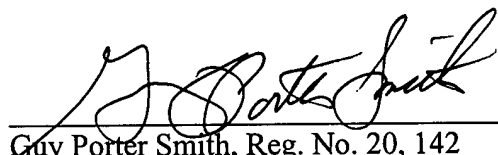
In view of the foregoing, it is respectfully submitted that independent claim 2 is patentably distinct over the primary reference when considered alone or in combination with the secondary reference such as Tielemans. Similarly, it is submitted that the dependent claims 3-7 add specific patentably distinct features that, when considered in the environment of allowable independent claim 2, present patentably distinct dependent claims.

It is noted that the draftsman has indicated the need for formal drawings in the present application. It is applicant's intention to submit formal drawings once allowable subject matter has been determined in the present application.

Reconsideration and allowance of claims 2-7 is respectfully requested.

A two month extension of time to respond to the Office Action is requested and a check in the amount of \$390.00 accompanies this petition. The Commissioner is hereby authorized to charge any additional fees which may be required or credit any overpayment to Account No. 16-2230.

August 10, 2001



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